THE INFLUENCE OF STAND DENSITY ON RATE OF CARBON SEQUESTRATION IN LOBLOLLY PINE PLANTATIONS ON MINED LANDS IN EAST TEXAS

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The State of Texas emits more carbon dioxide (CO_2) into the atmosphere than any other state in the United States. With environmental concerns escalating, the U.S. may be forced to reduce its emissions of greenhouse gases. The first target of these reductions will likely be utility companies that utilize coal-fired power plants. In order to mitigate CO_2 emissions, utility companies may want to either purchase carbon credits which can be obtained through carbon sequestration on NIPF lands or manage reclaimed mined lands for maximum carbon sequestration. This study determined the financially optimal planting density and management regimes for loblolly pine (*Pinus* taeda) planted on reclaimed mined lands and NIPF lands in East Texas given the objectives of maximizing revenue from timber production and the combination of timber production and carbon sequestration. PTAEDA2, a forest stand growth simulator, was used to predict growth and yield from establishment to final harvest. Dynamic computer programming was used to perform economic analyses given current stumpage prices, management costs, and real price and cost increases. Other inputs used include planting densities 5x10, 6x10, 7x10, and 8x10 feet, site indices 50 - 90, either 0, 1, or 2 thinnings, thinning intensities of 20, 25, 30, or 35 percent of basal area removed, carbon values per ton of $0, $10, $50, and $100, and rotations of up to 60 years in length. A total of 14,084,256 operable thinning and harvest schedules were calculated for real alternative rates of return (ARR) of 2.5 to 15.0 percent. Soil expectation values (SEV) were used to select financially optimal schedules. Results indicate that when the value per ton of carbon is $0, the 8x10 planting density provides the greatest financial returns. As the price per ton of carbon increases, the soil expectation value is maximized by utilizing higher planting densities.

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